

EMC Components

AVR-M Series

Varistors Countermeasure for Surge and Static Electricity
SMD

FEATURES

- The AVR-M series chip varistors provide excellent application reliability as a result of their Ag base terminal electrodes with Ni+Sn electroplating.
- There is no asymmetrical degradation as with bismuth zinc oxide varistors.

APPLICATIONS

A countermeasure against static electricity and surges in portable electronic appliances, measurement devices, control devices, home electronic appliances, A/V equipment, and other electronic devices.

TEMPERATURE RANGES

Operating	-40 to +125°C
Storage	-40 to +125°C

PRODUCT IDENTIFICATION

AVR-M	1608	C	120	M	T	6A	_
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

(1)Series name

(2)Element dimensions

(3)Chip type

(4)Varistor voltage

120 12×10^0 (V)

(5)Varistor voltage tolerance

K	$\pm 10\%$
M	$\pm 20\%$

(6)Packaging style

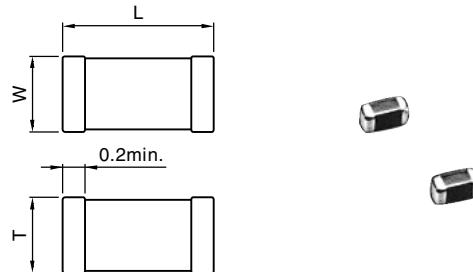
T	Taping
B	Bulk

(7)Capacitance tolerance

2A	Low capacitance
6A	Standard

(8)TDK internal code

SHAPES AND DIMENSIONS

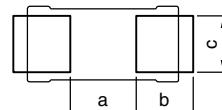


Dimensions in mm

Type	L	W	T	Weight typ.
1005	1 ± 0.05	0.5 ± 0.05	0.5 ± 0.05	1.2mg
1608	1.6 ± 0.1	0.8 ± 0.1	0.8 ± 0.1	5mg
2012	2 ± 0.2	1.25 ± 0.2	1 ± 0.2	15mg

RECOMMENDED PC BOARD PATTERN

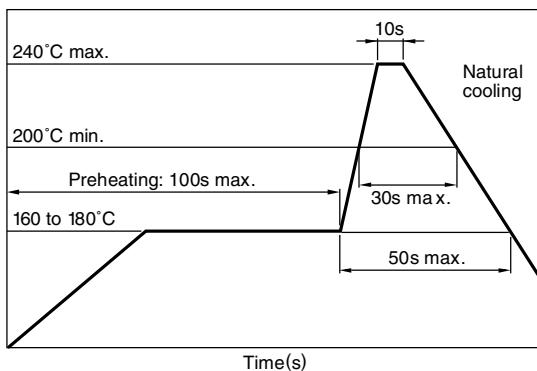
REFLOW SOLDERING



Dimensions in mm

Type	a	b	c
1005	0.3 to 0.5	0.35 to 0.45	0.4 to 0.6
1608	0.6 to 0.8	0.6 to 0.8	0.6 to 0.8
2012	0.9 to 1.2	0.7 to 0.9	0.9 to 1.2

RECOMMENDED REFLOW SOLDERING CONDITIONS



EMC Components

AVR-M Series

Varistors Countermeasure for Surge and Static Electricity SMD

ELECTRICAL CHARACTERISTICS

Part No.	Varistor voltage (Breakdown voltage) $E_{1mA}(V)$	Maximum continuous voltage (Working voltage) $E_{dc}(V)$	Clamping voltage (V) [8/20μs]	Energy (Joule) [10/1000μs]	Peak current(A) [8/20μs]	Resistance(ref.) ^{*1} [5 to 35°C] Resistance (MΩ)	Voltage (V)	Capacitance(ref.) (pF) [1kHz, Erms 1V]	
1005 type									
AVR-M1005C080M□ ^{*2} AAB	8	6.4 to 9.6	5.5 max.	14[1A]	0.04 max.	25 max.	1 min.	3	650
AVR-M1005C080M□ABB	8	6.4 to 9.6	5.5 max.	15[1A]	0.02 max.	3 max.	1 min.	3	100
AVR-M1005C120M□AAB	12	9.6 to 14.4	7.5 max.	20[1A]	0.05 max.	10 max.	1 min.	3	130
AVR-M1005C270M□AAB	27	21.6 to 32.4	15 max.	50[1A]	0.06 max.	4 max.	1 min.	5	40
AVR-M1005C270M□ABB	27	21.6 to 32.4	15 max.	50[1A]	0.05 max.	1 max.	1 min.	5	15
1608 type									
AVR-M1608C080M□AAB	8	6.4 to 9.6	5.5 max.	15[2A]	0.09 max.	30 max.	1 min.	3	650
AVR-M1608C120M□6AB	12	9.6 to 14.4	7.5 max.	20[2A]	0.09 max.	50 max.	1 min.	5	1050
AVR-M1608C120M□2AB	12	9.6 to 14.4	7.5 max.	20[2A]	0.06 max.	15 max.	1 min.	5	400
AVR-M1608C180M□6AB	18	14.4 to 21.6	11 max.	30[2A]	0.1 max.	30 max.	1 min.	5	600
AVR-M1608C220K□6AB	22	19.8 to 24.2	16 max.	34[2A]	0.1 max.	30 max.	5 min.	5	560
AVR-M1608C220K□2AB	22	19.8 to 24.2	16 max.	37[2A]	0.03 max.	10 max.	5 min.	5	210
AVR-M1608C270K□6AB	27	24 to 30	19 max.	42[2A]	0.1 max.	48 max.	5 min.	5	430
AVR-M1608C270K□2AB	27	24 to 30	19 max.	42[2A]	0.1 max.	20 max.	5 min.	5	160
AVR-M1608C270M□AAB	27	21.6 to 32.4	17 max.	52[2A]	0.05 max.	2 max.	1 min.	5	30
AVR-M1608C270M□ABB	27	21.6 to 32.4	17 max.	52[2A]	0.05 max.	2 max.	1 min.	5	15
2012 type									
AVR-M2012C120M□6AB	12	9.6 to 14.4	7.5 max.	20[5A]	0.2 max.	60 max.	1 min.	5	1000
AVR-M2012C220K□6AB	22	19.8 to 24.2	16 max.	38[5A]	0.3 max.	100 max.	5 min.	5	800
AVR-M2012C390K□6AB	39	35 to 43	28 max.	62[5A]	0.3 max.	100 max.	5 min.	5	430

^{*1} Resistance after soldering is 1MΩ min.(typical)

Soldering condition

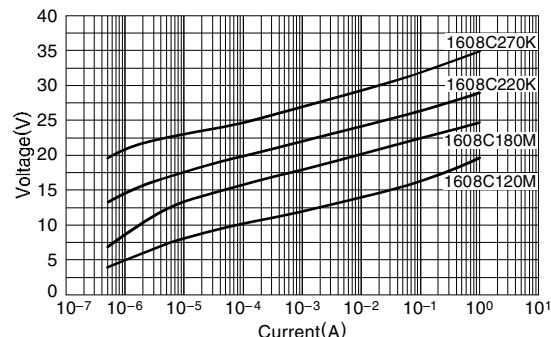
Temperature profile: 230°C max. Number of soldering: 1 time

Solder paste: Tamura Corporation(Tokyo, Japan) RMA-20-21 Measurement shall be made 24 hours after soldering.

^{*2} □ : Packaging style(T: Taping/B: Bulk)

• Operating and storage temperature: -40 to +125°C

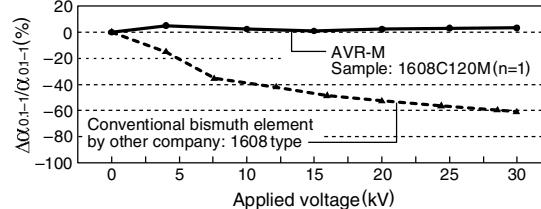
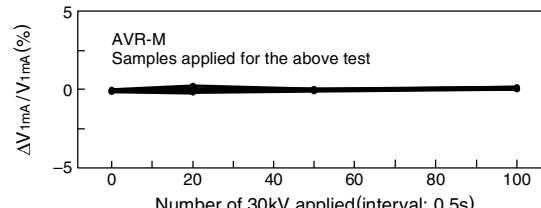
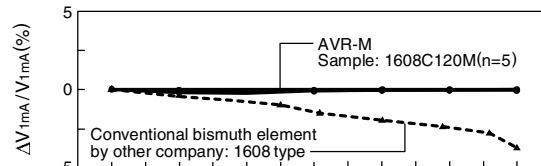
VOLTAGE vs. CURRENT CHARACTERISTICS



SURGE WITHSTAND CHARACTERISTICS

(ESD withstand test)

IEC1000-4 COMPLIANT/TEST APPARATUS:
NOISE LABORATORY CO., LTD.'s ESS-630A



EMC Components

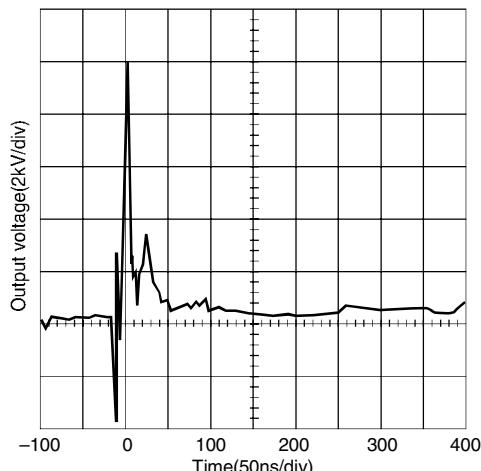
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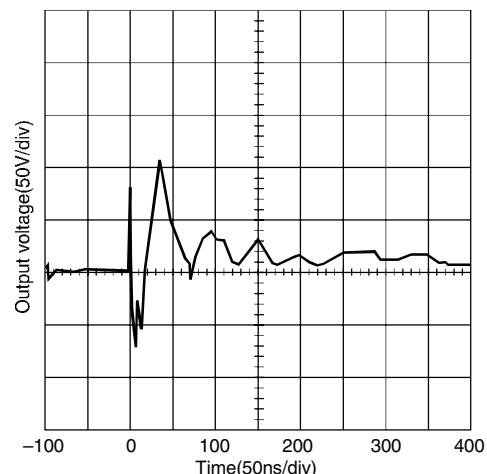
ELECTROSTATIC ABSORPTION WAVEFORM

TEST INSTRUMENT: ESS-630A/HP54540C, NOISE KENKYUSHO K.K.

ELECTROSTATIC CONTACT DISCHARGE WAVEFORM
(PRIOR TO COUNTERMEASURES)
COMPLIANT WITH IEC801-2/10kV



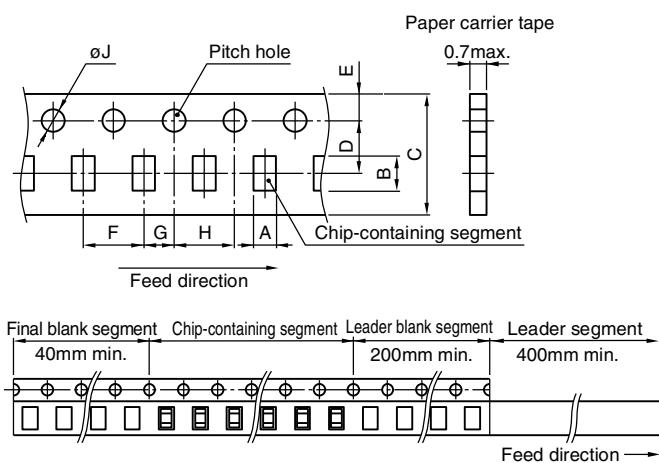
AFTER USE OF CHIP VARISTOR AS COUNTERMEASURE
AVR-M1608C120MB6A/110V



PACKAGING STYLES

TAPING SPECIFICATIONS

1005 AND 1608 TYPES

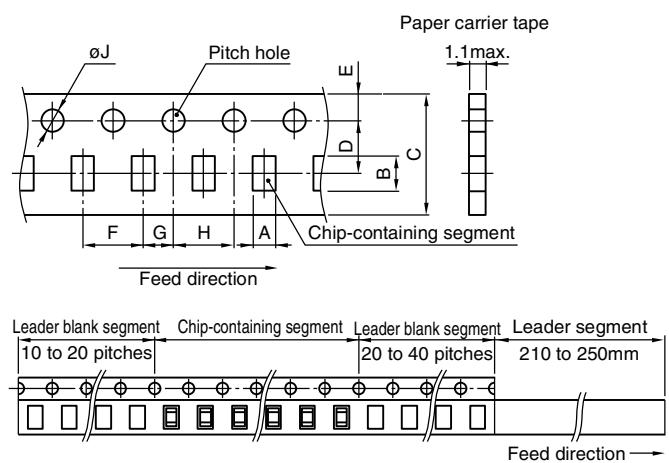


- Cumulative pitch hole shift is within $\pm 0.3\text{mm}$ over a 10-pitch interval.

Dimensions in mm		
Type(EIA)	1005(CC0402)	1608(CC0603)
A	0.65+0.05, -0.1	1.1±0.2
B	1.15+0.05, -0.1	1.9±0.2
C	8±0.3	8±0.3
D	3.5±0.05	3.5±0.05
E	1.75±0.1	1.75±0.1
F	2±0.05	4±0.1
G	2±0.05	2±0.05
H	4±0.05	4±0.1
J	1.5+0.1, -0	1.5+0.1, -0

- Packaging quantities
10000 pieces/reel(1005 type), 4000 pieces/reel(1608 type)

2012 TYPE



- Cumulative pitch hole shift is within $\pm 0.3\text{mm}$ over a 10-pitch interval.

Dimensions in mm	
Type(EIA)	2012(CC0805)
A	1.5±0.2
B	2.3±0.2
C	8±0.3
D	3.5±0.05
E	1.75±0.1
F	4±0.1
G	2±0.05
H	4±0.1
J	1.5+0.1, -0

- Packaging quantities
2000 pieces/reel